

WHAT IS CLAIMED IS:

1 1. An administration device for providing automatic performance
2 optimization of virtualized storage allocation within a network of storage elements,
3 comprising:
4 memory for storing data thereon; and
5 a processor configured for receiving from a user a request for storage of data, for
6 obtaining workload requirements of the user making the request, for analyzing system
7 parameters and for providing storage to meet the workload requirements based on the
8 analysis of the system parameters.

1 2. The administration device of claim 1, wherein the processor provides
2 storage to meet the workload requirements based on the workload requirements of the
3 user and storage requirements for the data.

1 3. The administration device of claim 1, wherein the processor provides
2 storage to meet the workload requirements by selecting storage locations that meet
3 performance and space requirements of the request.

1 4. The administration device of claim 3, wherein the processor selects
2 storage locations that meet the performance and space requirements through analysis of
3 the request for storage.

1 5. The administration device of claim 3, wherein the processor selects
2 storage locations that meet the performance and space requirements through a storage
3 policy mechanism.

1 6. The administration device of claim 1, wherein the processor determines
2 workload attributes of the user and desired levels of performance, retains the latest
3 information about the available capacity within the network of storage elements,
4 determines performance characteristics of individual storage devices at different locations
5 within the network as a function of the workload requirements of the user, and
6 determines a presence and attributes of competing workloads sharing the storage devices
7 over extended periods of time.

1 7. The administration device of claim 1, wherein the processor is configured
2 for obtaining workload requirements of the user by using canned workload descriptions
3 that are based on characterizations of user environments across various industries and
4 applications.

1 8. The administration device of claim 1, wherein the processor is configured
2 for obtaining workload requirements of the user by automatically creating workload
3 requirements based on observations of storage access patterns of a user.

1 9. The administration device of claim 1, wherein the processor is configured
2 for obtaining workload requirements of the user by using intelligent software components
3 that analyze workload descriptions for an application of the user.

1 10. The administration device of claim 1, wherein the processor is configured
2 for accessing a virtualization engine and volume managers to stripe data within a virtual
3 disk across managed storage devices.

1 11. The administration device of claim 1, wherein the processor is configured
2 for determining how to relocate virtual disks to meet a desired level of performance.

1 12. The administration device of claim 1, wherein the processor is configured
2 for performing a calibration process to discover the performance capabilities of the
3 underlying storage devices.

1 13. A network storage system, comprising:
2 a plurality of storage devices;
3 a plurality of servers coupled to the plurality of storage devices via network
4 interconnect; and
5 an administration device, coupled to at least the plurality of storage devices, for
6 providing automatic performance optimization of virtualized storage allocation within a
7 network of storage elements, wherein the administration device further comprises:
8 memory for storing data thereon; and
9 a processor configured for receiving from a user a request for storage of
10 data, for obtaining workload requirements of the user making the request, for analyzing
11 system parameters and for providing storage to meet the workload requirements based on
12 the analysis of the system parameters.

1 14. The network storage system of claim 13, wherein the processor provides
2 storage to meet the workload requirements based on the workload requirements of the
3 user and storage requirements for the data.

1 15. The network storage system of claim 13, wherein the processor provides
2 storage to meet the workload requirements by selecting storage locations that meet
3 performance and space requirements of the request.

1 16. The network storage system of claim 15, wherein the processor selects
2 storage locations that meet the performance and space requirements through analysis of
3 the request for storage.

1 17. The network storage system of claim 15, wherein the processor selects
2 storage locations that meet the performance and space requirements through a storage
3 policy mechanism.

1 18. The network storage system of claim 13, wherein the processor determines
2 workload attributes of the user and desired levels of performance, retains the latest
3 information about the available capacity within the network of storage elements,
4 determines performance characteristics of individual storage devices at different locations
5 within the network as a function of the workload requirements of the user, and
6 determines a presence and attributes of competing workloads sharing the storage devices
7 over extended periods of time.

1 19. The network storage system of claim 13, wherein the processor is
2 configured for obtaining workload requirements of the user by using canned workload
3 descriptions that are based on characterizations of user environments across various
4 industries and applications.

1 20. The network storage system of claim 13, wherein the processor is
2 configured for obtaining workload requirements of the user by automatically creating
3 workload requirements based on observations of storage access patterns of a user.

1 21. The network storage system of claim 13, wherein the processor is
2 configured for obtaining workload requirements of the user by using intelligent software
3 components that analyze workload descriptions for an application of the user.

1 22. The network storage system of claim 13, wherein the processor is
2 configured for accessing a virtualization engine and volume managers to stripe data
3 within a virtual disk across managed storage devices.

1 23. The network storage system of claim 13, wherein the processor is
2 configured for determining how to relocate virtual disks to meet a desired level of
3 performance.

1 24. The network storage system of claim 13, wherein the processor is
2 configured for performing a calibration process to discover the performance capabilities
3 of the underlying storage devices.

1 25. A method for providing automatic performance optimization of virtualized
2 storage allocation within a network of storage elements, comprising:
3 receiving from a user a request for storage of data;
4 obtaining workload requirements of the user making the request;
5 analyzing system parameters; and
6 providing storage to meet the workload requirements of the user based on the
7 analysis of the system parameters.

1 26. The method of claim 25, wherein the providing storage to meet the
2 workload requirements of the user is further based on the workload requirements of the
3 user and storage requirements for the data.

1 27. The method of claim 25, wherein the providing storage to meet the
2 workload requirements of the user further comprises selecting storage locations that meet
3 performance and space requirements of the request.

1 28. The method of claim 27, wherein the selecting storage locations that meet
2 the performance and space requirements are provided with the request for storage.

1 29. The method of claim 27, wherein the selecting storage locations that meet
2 the performance and space requirements are provided through a storage policy
3 mechanism.

1 30. The method of claim 25, wherein the analyzing system parameters further
2 comprises determining the workload attributes of the user and desired levels of
3 performance, retaining the latest information about the available capacity within the
4 network of storage elements, determining performance characteristics of the storage
5 devices at different locations within the network as a function of the workload
6 requirements of the user, and determining a presence and attributes of competing
7 workloads sharing the storage devices over extended periods of time.

1 31. The method of claim 25, wherein the obtaining workload requirements of
2 the user making the request further comprises using canned workload descriptions that
3 are based on characterizations of user environments across various industries and
4 applications.

1 32. The method of claim 25, wherein the obtaining workload requirements of
2 the user making the request further comprises automatically creating workload
3 requirements based on observations of storage access patterns of a user.

1 33. The method of claim 25, wherein the obtaining workload requirements of
2 the user making the request further comprises using intelligent software components that
3 analyze workload descriptions for an application of the user.

1 34. The method of claim 25 further comprising accessing a virtualization
2 engine and volume managers to stripe data within a virtual disk across managed storage
3 devices.

1 35. The method of claim 34, wherein the striping data further comprises
2 determining how to relocate virtual disks to meet a desired level of performance.

1 36. The method of claim 25, further comprising performing a calibration
2 process to discover the performance capabilities of the underlying storage devices.

1 37. A program storage device readable by a computer, the program storage
2 device tangibly embodying one or more programs of instructions executable by the
3 computer to perform a method for providing automatic performance optimization of
4 virtualized storage allocation within a network of storage elements, the method
5 comprising:
6 receiving from a user a request for storage of data;
7 obtaining workload requirements of the user making the request;
8 analyzing system parameters; and
9 providing storage to meet the workload requirements of the user based on the
10 analysis of the system parameters.

1 38. The program storage device of claim 19, wherein the analyzing system
2 parameters further comprises determining workload attributes of the user and desired
3 levels of performance, retaining the latest information about the available capacity within
4 the network of storage elements, determining performance characteristics of storage
5 devices at different locations within the network as a function of the workload
6 requirements of the user, and determining a presence and attributes of competing
7 workloads sharing the storage devices over extended periods of time.

1 39. An administration device for providing automatic performance
2 optimization of virtualized storage allocation within a network of storage elements,
3 comprising:
4 means for storing data thereon; and
5 means configured for receiving from a user a request for storage of data, obtaining
6 workload requirements of the user making the request, analyzing system parameters and
7 providing storage to meet the workload requirements of the user based on the analysis of
8 the system parameters.

1 40. A network storage system, comprising:
2 first means for providing storage;
3 means for providing access to the means for providing storage; and
4 means, coupled to at least the plurality of storage devices, for providing automatic
5 performance optimization of virtualized storage allocation within a network of storage
6 elements, wherein the administration device further comprises:
7 second means for storing data thereon; and
8 means for receiving from a user a request for storage of data, obtaining
9 workload requirements of the user making the request, analyzing system parameters and
10 providing storage to meet the workload requirements of the user based on the analysis of
11 the system parameters.

1 41. A data structure resident in memory for providing automatic performance
2 optimization of virtualized storage allocation within a network of storage elements,
3 comprising at least one of a plurality of system attributes associated with determinations
4 concerning desired system performance and a plurality of mechanisms for obtaining
5 workload requirements.

1 42. The data structure of claim 41, wherein the plurality of system attributes
2 includes understanding of the user workload attributes and desired levels of performance,
3 keeping information about the available capacity within the network of storage elements,
4 understanding of the performance characteristics of the individual pieces of storage at
5 different locations within the network as a function of the user workload, and recognizing
6 the presence and attributes of competing workloads sharing the use of storage over
7 extended periods of time, as maintained in a historical performance database.

1 43. The data structure of claim 41, wherein the plurality of mechanisms for
2 obtaining workload requirements include canned workload descriptions; automatically
3 created workload descriptions based on observations of a customer's workload and
4 workload descriptions provided by intelligent software components.